

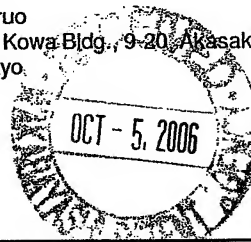
From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF TRANSMITTAL
OF COPIES OF TRANSLATION
OF THE INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY
(CHAPTER I OR CHAPTER II
OF THE PATENT COOPERATION TREATY)
(PCT Rules 44bis.3(c) and 72.2)

To:

MIYAZAKI, Teruo
8th Floor, 16th Kowa Bldg., 9-20 Akasaka 1-chome,
Minato-ku, Tokyo
1070052
JAPON



Date of mailing (day/month/year)
28 September 2006 (28.09.2006)

Applicant's or agent's file reference
NE04P350

IMPORTANT NOTIFICATION

International application No.
PCT/JP2005/002124

International filing date (day/month/year)
14 February 2005 (14.02.2005)

Applicant

NEC CORPORATION et al

1. Transmittal of the translation to the applicant.

The International Bureau transmits herewith a copy of the English translation of the international preliminary report on patentability (Chapter I).



The International Bureau transmits herewith a copy of the English translation of the international preliminary report on patentability (Chapter II).

2. Transmittal of the copy of the translation to the designated or elected Offices.

The International Bureau notifies the applicant that copies of that translation have been transmitted to the following designated or elected Offices requiring such translation:

None

The following designated or elected Offices, having waived the requirement for such a transmittal at this time, will receive copies of that translation from the International Bureau only upon their request:

AE, AG, AL, AM, AP, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EA, EC, EE, EG, EP, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OA, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW

3. Reminder regarding translation into (one of) the official language(s) of the elected Office(s).

The applicant is reminded that, where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary report on patentability (Chapter II).

It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned within the applicable time limit (Rule 74.1). See Volume II of the PCT Applicant's Guide for further details.

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Authorized officer

Yoshiko Kuwahara



Facsimile No. +41 22 338 82 70

Facsimile No. +41 22 338 82 70

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference NE04P350	FOR FURTHER ACTION	See item 4 below
International application No. PCT/JP2005/002124	International filing date (<i>day/month/year</i>) 14 February 2005 (14.02.2005)	Priority date (<i>day/month/year</i>) 13 February 2004 (13.02.2004)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant NEC CORPORATION		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

- | | | |
|-------------------------------------|--------------|---|
| <input checked="" type="checkbox"/> | Box No. I | Basis of the report |
| <input type="checkbox"/> | Box No. II | Priority |
| <input type="checkbox"/> | Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| <input checked="" type="checkbox"/> | Box No. IV | Lack of unity of invention |
| <input checked="" type="checkbox"/> | Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input type="checkbox"/> | Box No. VI | Certain documents cited |
| <input type="checkbox"/> | Box No. VII | Certain defects in the international application |
| <input type="checkbox"/> | Box No. VIII | Certain observations on the international application |

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Date of issuance of this report 19 September 2006 (19.09.2006) Authorized officer <div style="text-align: center; font-weight: bold;">Yoshiko Kuwahara</div> e-mail: pt07@wipo.int
---	--

PATENT COOPERATION TREATY

TRANSLATION

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To:

Date of mailing
(day/month/year)

Applicant's or agent's file reference

NE04P350

FOR FURTHER ACTION

See paragraph 2 below

International application No.

PCT/JP2005/002124

International filing date (day/month/year)

14.02.2005

Priority date (day/month/year)

13.02.2004

International Patent Classification (IPC) or both national classification and IPC

Applicant

NEC CORPORATION

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☒ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/JP

Authorized officer

Facsimile No.

Telephone No.

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/JP2005/002124

Box No. I

Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐

This opinion has been established on the basis of a translation from the original language into the following language

_____, which is the language of a translation furnished for the purposes of international search (under Rule 12.3 and 23.1(b)).

2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

☐

a sequence listing

☐

table(s) related to the sequence listing

b. format of material

☐

in written format

☐

in computer readable form

c. time of filing/furnishing

☐

contained in the international application as filed.

☐

filed together with the international application in computer readable form.

☐

furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/JP2005/002124

Box No. IV Lack of unity of invention

1. ☒ In response to the invitation (Form PCT/ISA/206) to pay additional fees the applicant has:
- ☒ paid additional fees
- ☐ paid additional fees under protest
- ☐ not paid additional fees
2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is
- ☐ complied with
- ☒ not complied with for the following reasons:

The inventions of claims 1-39, 43-81, 85-123, 127-129 relate to a reception device that performs nulling with respect to a received signal by using a channel matrix.

On the other hand, the inventions of claims 40-42, 82-84, 124-126 relate to a reception device using an Euclid distance converted by performing a random function computation.

Accordingly, the inventions of claims 1-39, 43-81, 85-123, 127-129 and the inventions of claims 40-42, 82-84, 124-126 have no common matter that can be considered as a special technical feature. Therefore, the inventions of claims 1-129 clearly do not satisfy the requirement of the unity of inventions.

4. Consequently, this opinion has been established in respect of the following parts of the international application:

- ☒ all parts
- ☐ the parts relating to claims Nos. _____

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/JP2005/002124

Box No. V	Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement		
1. Statement			
Novelty (N)	Claims	<u>7, 10, 12-26, 28-39, 49, 52, 54-68, 70-81, 91, 94, 96-110, 112-123</u>	YES
	Claims	<u>1-6, 8, 9, 11, 27, 40-48, 50, 51, 53, 69, 82-90, 92, 93, 95, 111, 124-129</u>	NO
Inventive step (IS)	Claims	<u>24-26, 28-33, 37, 66-68, 70-75, 79, 108-110, 112-117, 121</u>	YES
	Claims	<u>1-23, 27, 34-36, 38-65, 69, 76-78, 80-107, 111, 118-120, 122-129</u>	NO
Industrial applicability (IA)	Claims	<u>1-129</u>	YES
	Claims		NO
2. Citations and explanations:			
<p>Document 1: K. B. Letaief, Eunyoung Choi, Jae-Young Ahn, R. Chen, "Joint maximum likelihood detection and interference cancellation for MIMO/OFDM system", Vehicular Technology Conference, 2003. VTC 2003-Fall. 2003 IEEE 58th, Vol. 1, p.612-616, 09 October 2003</p> <p>Document 2: JP 2001-36440 A (NTT DoCoMo Inc.), 09 February 2001, Par. Nos. 0010, 0026-0031, all drawings (Family: none)</p> <p>A. The inventions of claims 1-6, 8, 9, 11, 27, 43-48, 50, 51, 53, 69, 85-90, 92, 93, 95, 111, 127-129 do not appear possess novelty based on document 1 cited in the ISR.</p> <p>Claims 1, 43, 85, 127</p> <p style="padding-left: 40px;">The computation with formulas (15), (16) described on page 614 of document 1 is equivalent to "performing the nulling that indicates orthogonality of the signal with respect to the signal received by using a channel matrix" described in claims 1, 43, 85, 127.</p> <p>Claims 2, 3, 44, 45, 86, 87, 128, 129</p> <p style="padding-left: 40px;">In addition to the description above, document 1 also discloses performing the MLD (Maximum Likelihood Detection). Therefore, the feature of "computing and outputting the likelihood relating to the transmitted signal" that is described in claims 2, 3, 44, 45, 86, 87, 128, 129 is also disclosed.</p> <p>Claims 4-6, 46-48, 88-90</p> <p style="padding-left: 40px;">In addition to the description above, document 1 also discloses "using a complex transposed matrix of a Q matrix obtained by QR analysis of the channel matrix as nulling" described in claims 4, 46, 88 (see Formula (13)).</p> <p style="padding-left: 40px;">Furthermore, referring to Formula (17) and explanation thereof, "performing demodulation of transmitted signal in the order of descending from the transmission sequence transmitted from the M-th transmission antenna to the transmission sequence transmitted from the 1st transmission antenna" described in claims 5, 47, 89 is found to be disclosed.</p>			

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of: Box V

Claims 8, 9, 11, 27, 50, 51, 53, 69, 92, 93, 95, 111

In addition to the description above, document 1 also apparently discloses that "a priority order is determined between the transmission sequences that are transmitted from the transmission antennas based on the received signals" and that "a candidate sequence for a conversion signal is determined and outputted as a candidate transmission sequence based on the received signal" (see IV. PROPOSED DETECTION ALGORITHM).

Furthermore, referring to Formula (23) and explanation thereof, a feature of determining the priority order by using the ratio of noise power and the received power that was described in claims 27, 69, 111 is apparently also disclosed.

B. The inventions of claims 40-42, 82-84, 124-126 do not appear to possess novelty based on document 2 cited in the ISR.

Claims 40-42, 82-84, 124-126

Document 2 discloses a wireless communication system in which "means for using an Euclid distance converted by performing a random function computation with respect to a square-law Euclid distance" is contained in a reception device.

C. The inventions of claims 15-22, 38, 39, 57-64, 80, 81, 99-106, 122, 123 do not appear to involve an inventive step based on document 1 cited in the ISR.

Claims 15-22, 38, 39, 57-64, 80, 81, 99-106, 122, 123

Employing the features described in claims 15-17, 56-59, 99-101 in a wireless communication system in which a transmission signal is estimated by using MLD, such as disclosed in document 1, is a matter that can be appropriately designed by a person skilled in the art. Furthermore, the features described in claims 18-22, 60-64, 102-106 are well-known features in the MLD technology, and the features described in claims 38, 39, 80, 81, 122, 123 are well-known features in the wireless communication technology.

D. The inventions of claims 7, 10, 12-14, 23, 34-36, 49, 52, 54-56, 65, 76-78, 91, 94, 96-98, 107, 118-120 do not appear to involve an inventive step based on document 1 and document 2 cited in the ISR.

Claims 7, 10, 12, 13, 49, 52, 54, 55, 91, 94, 96, 97

For example, as disclosed in Par. No. 0010 of document 2, reducing the computation volume by selecting and outputting a symbol candidate is a usually employed procedure.

Therefore, employing this technology in the wireless communication system disclosed in document 1 in order to create the inventions of claims 7, 10, 12, 13, 49, 52, 54, 55, 91, 94, 96, 97 is of no special difficulty.

Claims 14, 23, 34-36, 56, 65, 76-78, 98, 107, 118-120

"Using an Euclid distance converted by performing a random function computation with respect to a square-law Euclid distance" is a usual practice, as disclosed, for example, in document 2. Therefore, employing this technology in the wireless communication system disclosed in document 1 in order to create the inventions of claims 14, 23, 34-36, 56, 65, 76-78, 98, 107, 118-120 is of no special difficulty.

E. The inventions of claims 24-26, 28-33, 37, 66-68, 70-75, 79, 108-110, 112-117, 121 are neither described in the documents cited in the ISR nor obvious to a person skilled in the art.